

4.1 Sodar

Hourly averaged wind profile data were acquired by the Doppler sodar over 38 discrete range gates from 50 to 790 m above the ground with a resolution of 20 m. Upper-air climatological plots were generated based on the methodology developed by Wilczak et al. (1997). Sodar wind profiles for the months of August and September were compiled. Figure 57 is a contour plot of data availability (i.e., the percentage of valid data reported by the sodar). In general, 50% of the data are reported up to about 400 m between 0400 and 1900 UTC (2100 and 1200 PDT). The sodar range becomes more limited outside that time bracket (afternoon to early evening) with the 50% data availability level dropping down to just over 300 m.

The strongest winds (with respect to magnitude) occurs in the late afternoon to early evening between 2300 to 0400 UTC (1600 to 2100 PDT) with scalar average wind speeds of about 5 m s^{-1} . Wind speeds generally decrease overnight and increase in magnitude by mid- to late-morning because of convective heating. The strongest observed scalar winds of 7 m s^{-1} are found above 350 m between 1100 and 1600 UTC (0400 to 0900 PDT).

Vector average wind speeds are shown in Figure 59. Winds are extremely light ($\sim 1 \text{ m s}^{-1}$) in the early morning hours between 0700 and 1000 UTC (0000 to 0300 PDT) from the surface up to 200 m. Above that a wind flow from the east-southeast to southeast is observed to 400 m. The southeasterly begins to establish itself down to the surface prior to sunrise and remains until mid-morning to about 1700 UTC (1000 PDT). For about three hours until 2000 UTC (1300 PDT), the wind flow from the surface to about 250 m becomes very light with values of U dropping to less than 0.5 m s^{-1} . The southeasterly flow remains above 250 m, however, the wind speed decreases. The winds from the surface up to 200 m reverse direction and come from the northwest from early afternoon (2000 UTC / 1300 PDT) into the evening (0700 UTC / 0000 PDT). The flow above 200 m during that time becomes extremely light and variable.

Finally, Figure 60 is a contour plot of the persistence of the wind. Persistence is simply the ratio of the vector wind speed to the scalar wind speed. A value near 100% would represent a “persistent” wind that varies little over this two-month average while a low value represents a random wind flow. The most persistent flow are the southeasterly winds observed at the surface between 1000 to 1700 UTC (0300 to 1000 PDT) and aloft between 0700 and 2100 UTC (0000 to 1200 PDT). A second maximum in persistence exists for the northwesterly winds from the surface up to 200 m observed between 2000 to 0700 UTC (1300 to 0000 PDT). In general, these flows are repeated nearly every day during the late summer.

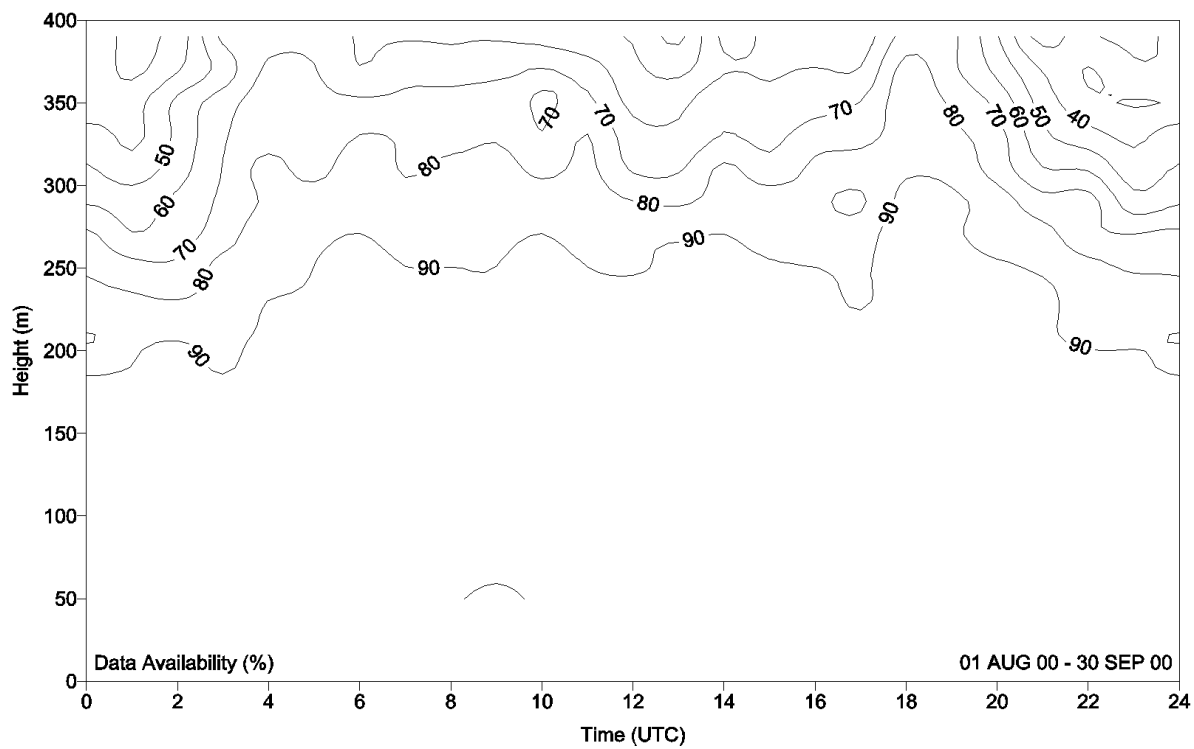


Figure 57. Sodar data availability as a function of time and height.

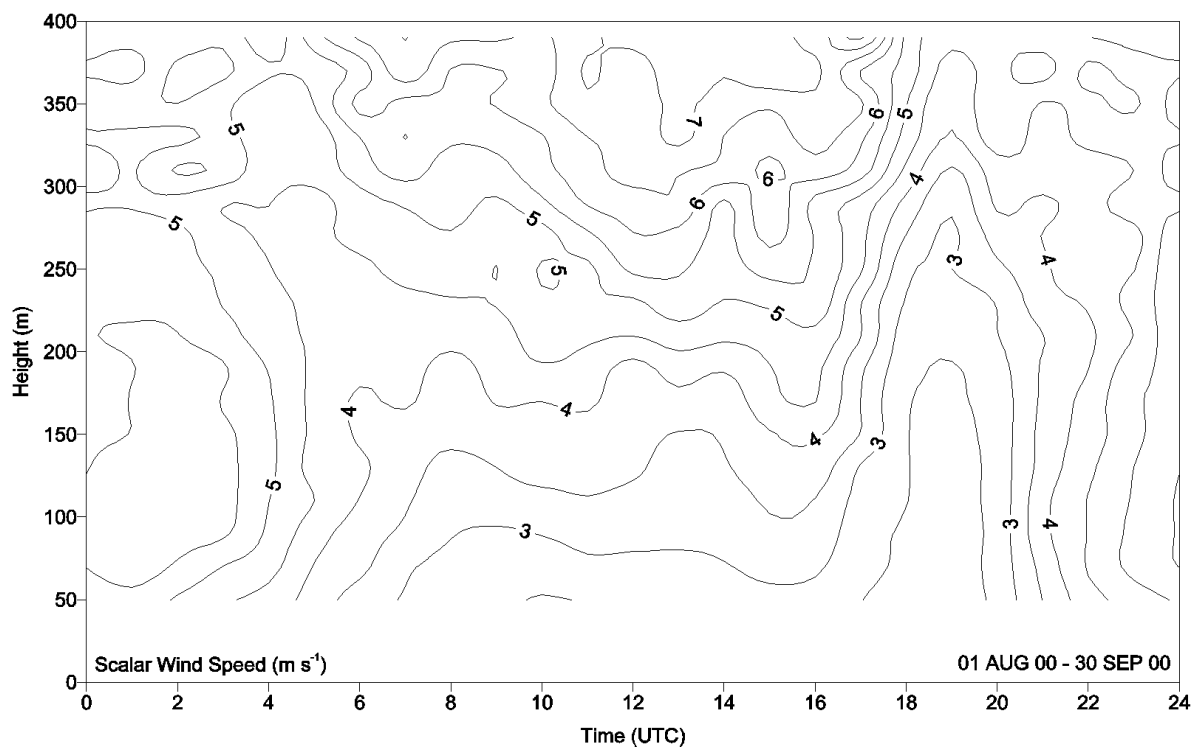


Figure 58. Sodar scalar wind speed as a function of time and height.

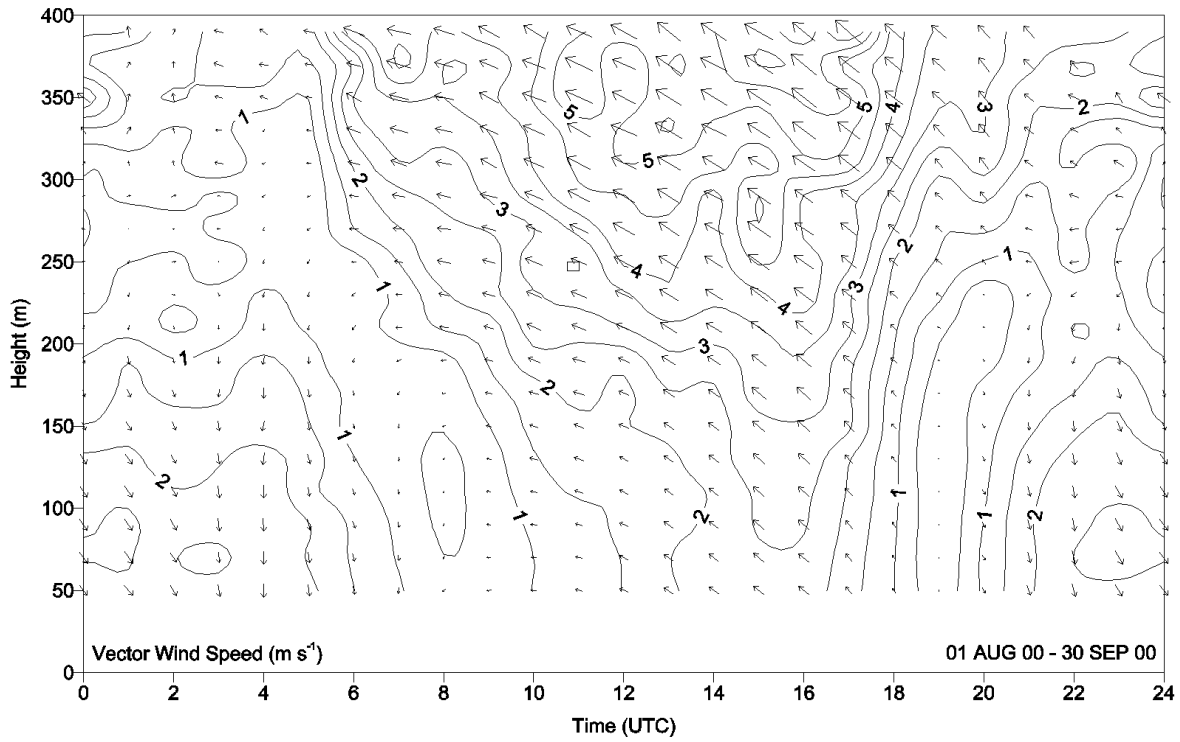


Figure 59. Sodar vector wind speed as a function of time and height.

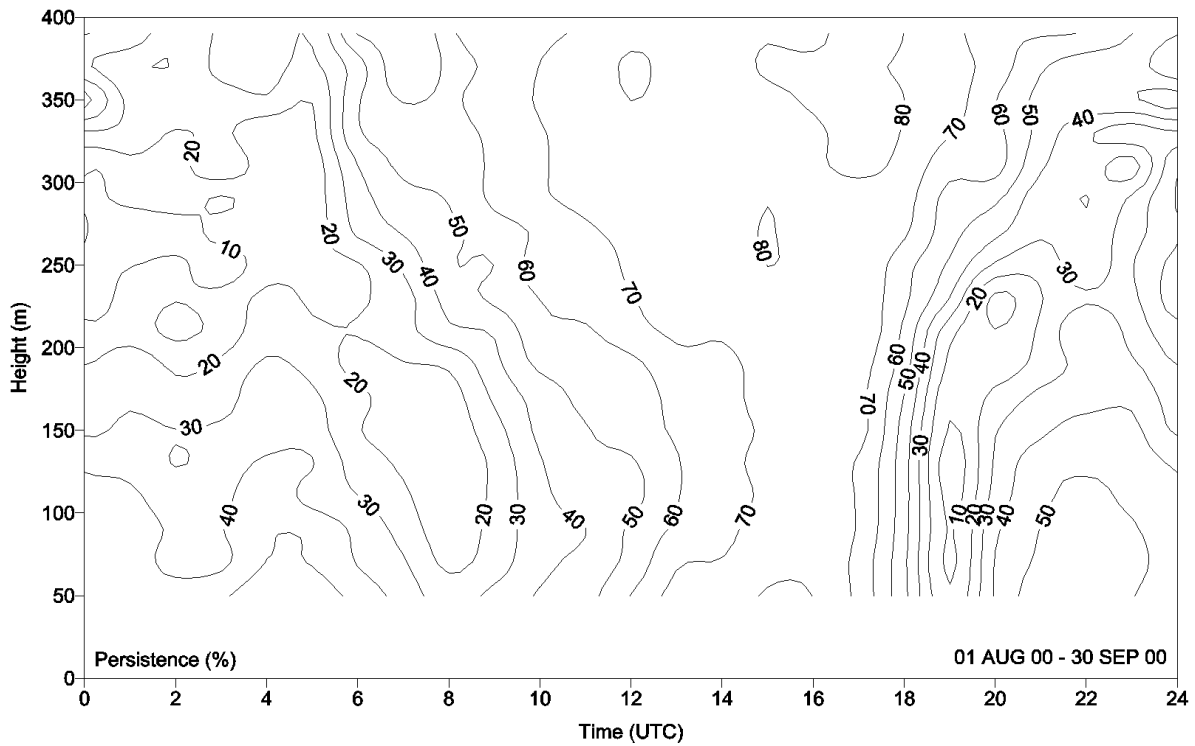


Figure 60. Sodar persistence as a function of time and height.